

INTEX-B: Flight 9 (Science/Transit Flight; March 21, 2006; Tuesday)

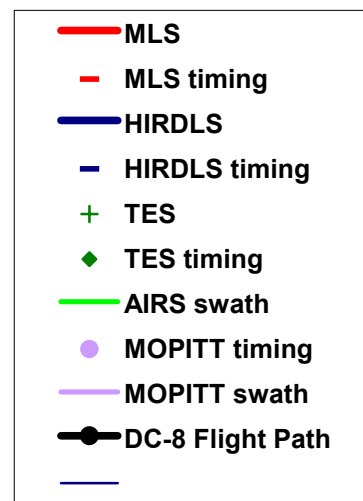
This was the seventh INTEX-B science/transit flight that started from Houston and concluded at Moffett Field, CA. This was the first of the two night flights planned for INTEX-B. The principle objective for this flight was validation of HIRDLS observations in the stratosphere and upper troposphere. This required flying at night in a cloud free environment. The DC-8 AROTAL Lidar, which measures O₃ and temperature and provides its deepest penetration in the stratosphere at night was a primary instrument for this validation. In-situ and remote measurements from the DC-8 along the devised flight plan would also be useful in the validation of TES and MLS observations. The nominal flight tracks and profiles are shown in the slides below but these were modified in-flight to take advantage of specific opportunities. Takeoff time was 9 pm (LT) and the flight duration was 7.5 hours.

All of the instruments aboard the DC-8 performed normally throughout the flight and atmospheric conditions for ideal to achieve stated objectives. The surface analysis for the transit flight contained elongated high pressure stretching from the U.S. - Canada border southward to Oklahoma. A weak high pressure ridge covered the Midwest; a weak short wave trough stretched from Oregon to Arizona; and a closed low was located off the Oregon coast. The subtropical jet stream was poorly defined; however, the polar jet was oriented from the Texas panhandle through southeastern New Mexico. As a result of these circulation systems, the flow mostly was westerly to southwesterly over most of the flight track. Cloud cover was a major factor in selecting the flight track. Southern portions of the flight track generally were cloud free. Cirrus along this track was not a major concern—even the subtropical jet stream was relatively free of cirrus. The aircraft was able to fly above much of the highest cirrus. There were some indications of a tropopause folding event (see slide 4); however the strongest folding appeared to be east of the flight.

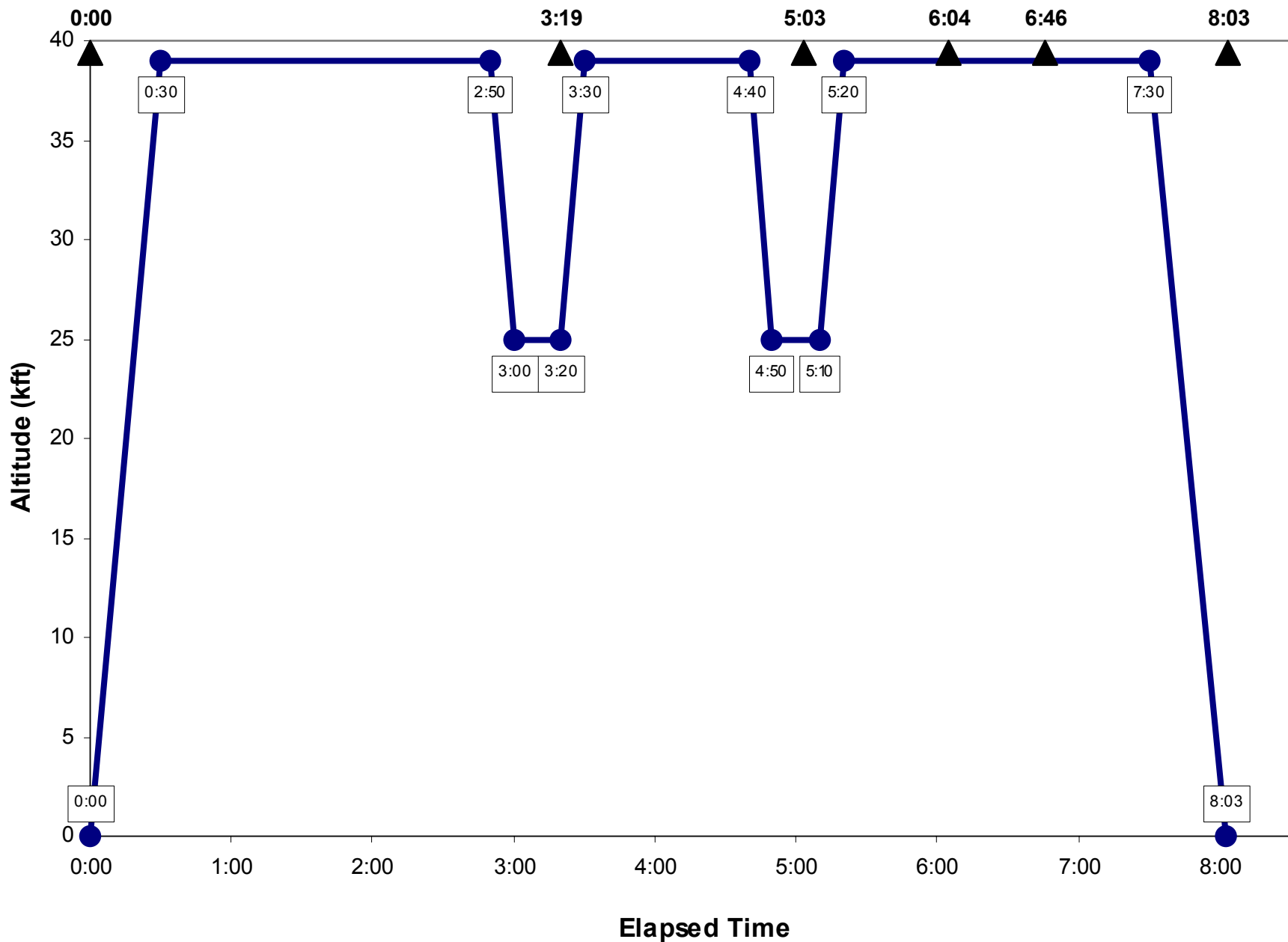
This was an excellent flight and we were able to meet all our objectives. We climbed out of Houston in the south westerly direction to 36 Kft encountering several layers of pollution (O₃>100 ppb) at 3km and 6 km during the climb. At altitude the air was free of cirrus clouds and extremely clean (CO-90 ppb; O₃-50 ppb; HNO₃-15 ppt; NO₂<50 ppt, SO₂-100 ppt) with little discernible stratospheric influences. At around 0600UT we descended to 25 Kft at the southernmost point of the flight track to begin the HIRDLS validation (see slides 2 and 3). Between 36 Kft and 25 Kft moderate amount of pollution was encountered (CO-125 ppb; O₃-80 ppb) providing opportunities for HIRDLS validation in the upper troposphere as well. Moving along this track we climbed back up to 37 Kft under cirrus free conditions. AROTAL observed significant ozone gradients in the stratosphere as can be seen in slide 5. Occasionally pollution layers were found to be mixed with stratospheric influences with CO of 100-150 ppb and O₃ of 100-200 ppb. There were indications that along the HIRDLS track stratospheric influences were present throughout the upper and middle troposphere (slide 6). After staying at 37 Kft for an extended period of time we descended to 25 Kft in a region where the HIRDLS track somewhat overlapped with MLS and TES tracks (points 3 to 4-slide 2). Once again significant pollution was sampled in the upper troposphere (CO>125 ppb; O₃>100 ppb; HCHO- 500 ppt; NO₂-100 ppt) although the levels moderated as we headed north at 25 Kft. We climbed back up to 37 Kft following the HIRDLS track to our northernmost point getting a full 20° latitude coverage for this Aura validation experiment. During this entire flight AROTAL was able to observe O₃ to 35 Km and temperature to 60 km ideal for HIRDLS validation. The DC-8 DIAL provides a profile of tropospheric pollution conditions encountered during this flight (slide 6). The in-situ instruments also collected data during this entire flight especially useful for the UT/LS region possibly showing Asian pollution influences. After completing the northerly leg the DC-8 encountered low fuel conditions and headed west at 37 Kft before landing at Moffett Field.

ICATS archived data files for INTEX-B are available at: <http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/ICATS/FY06/INTEX-B/index.html>

Flight 9
21 March 2006
Takeoff:
2100 hrs
Flight time: 8 hrs



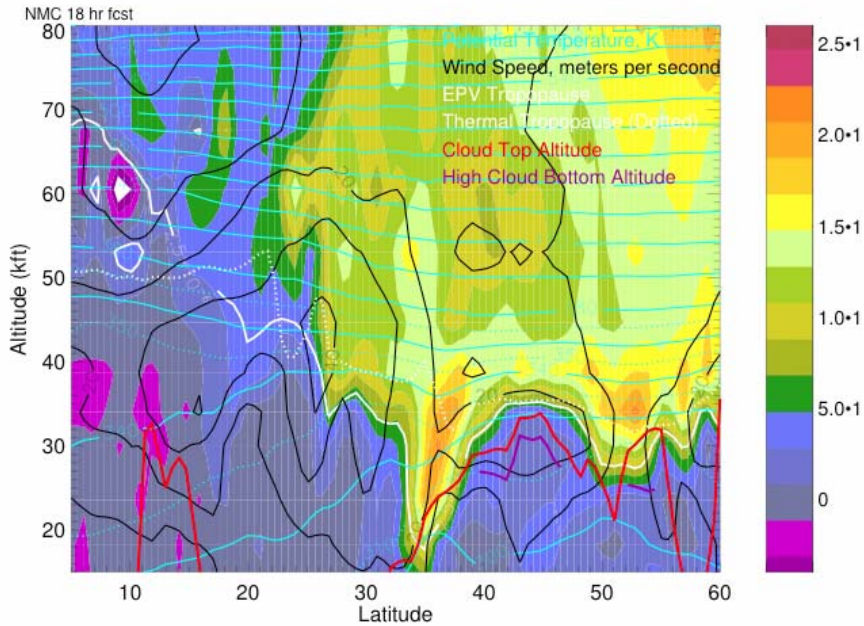
Point	1	2	3	4	5	6
Latitude	29.97	20	30	36	40	38
Longitude	-95.35	-113.8	-112.8	-112.7	-112.7	-122
Cum. Flt. Time	0:00	3:19	5:03	6:04	6:46	8:03
Leg Flt. Time		3:19	1:43	1:01	0:41	1:17
Local Time	21:00	0:19	2:03	3:04	3:46	5:03
UTC	3:00	6:19	8:03	9:04	9:46	11:03



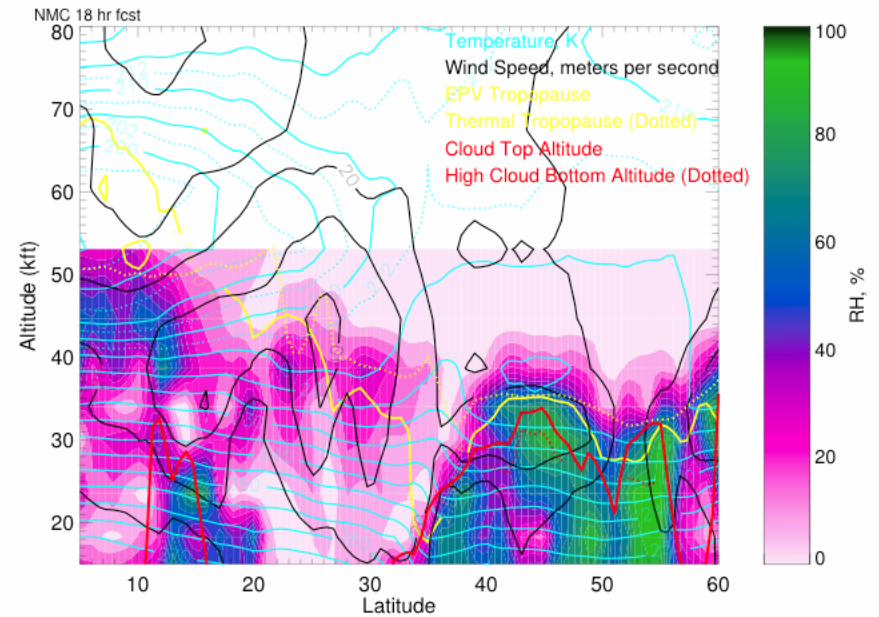
Note: In-Progress profiling in **Blue**; Spirals in **Red**; Way points annotated with triangles (?).

Potential vorticity and RH curtains along HIRDLS track 06/03/22

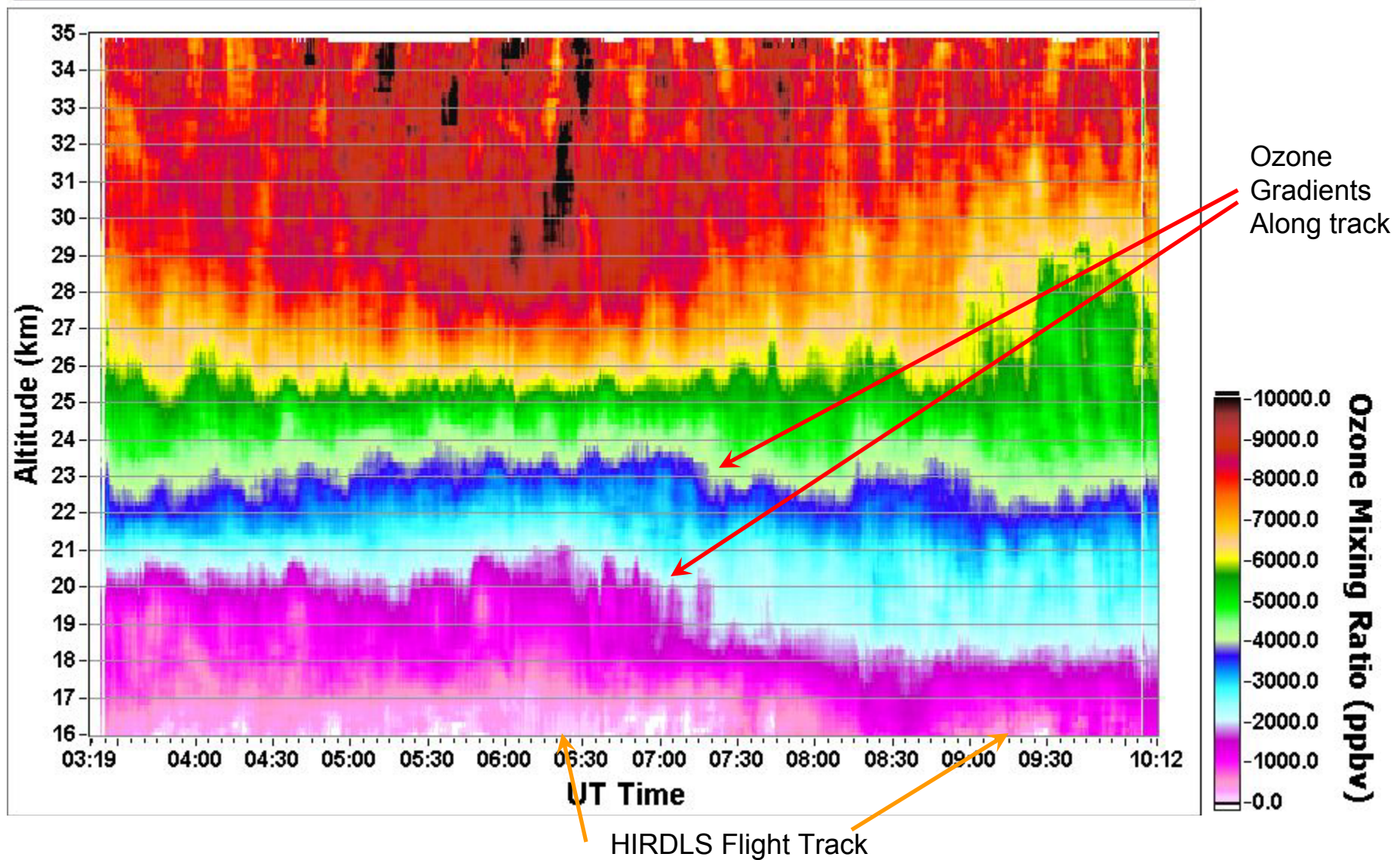
X-Sect along HIRDLS_060322 track for 06032206 meteorology

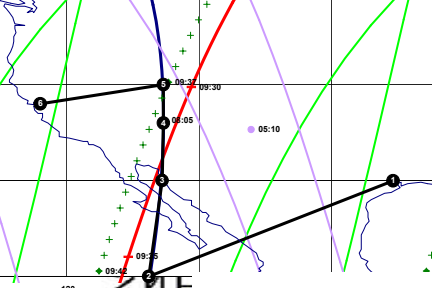


X-Sect along HIRDLS_060322 track for 06032206 meteorology



INTEX-B/ AROTAL Ozone Mixing Ratio
3/22/06 Transit to Ames
HIRDLS Track





Transit: Houston to Ames / HIRDLS
Aerosol Scattering Ratio (1064)

3-22-06

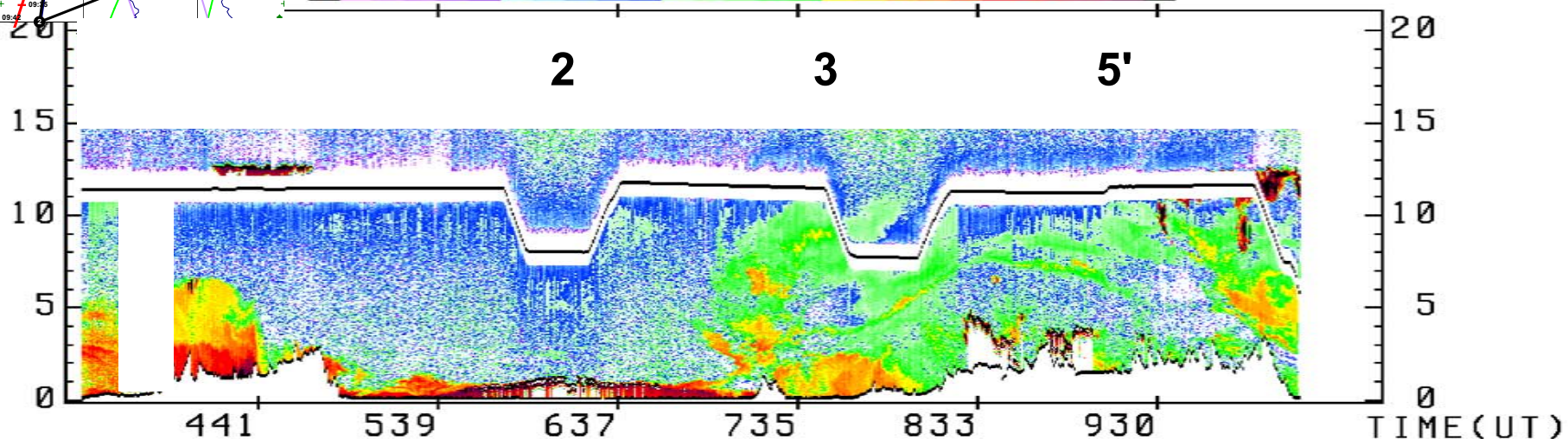
.01 0.10 1 10 50



2

3

5'



Ozone Mixing Ratio (ppbv)

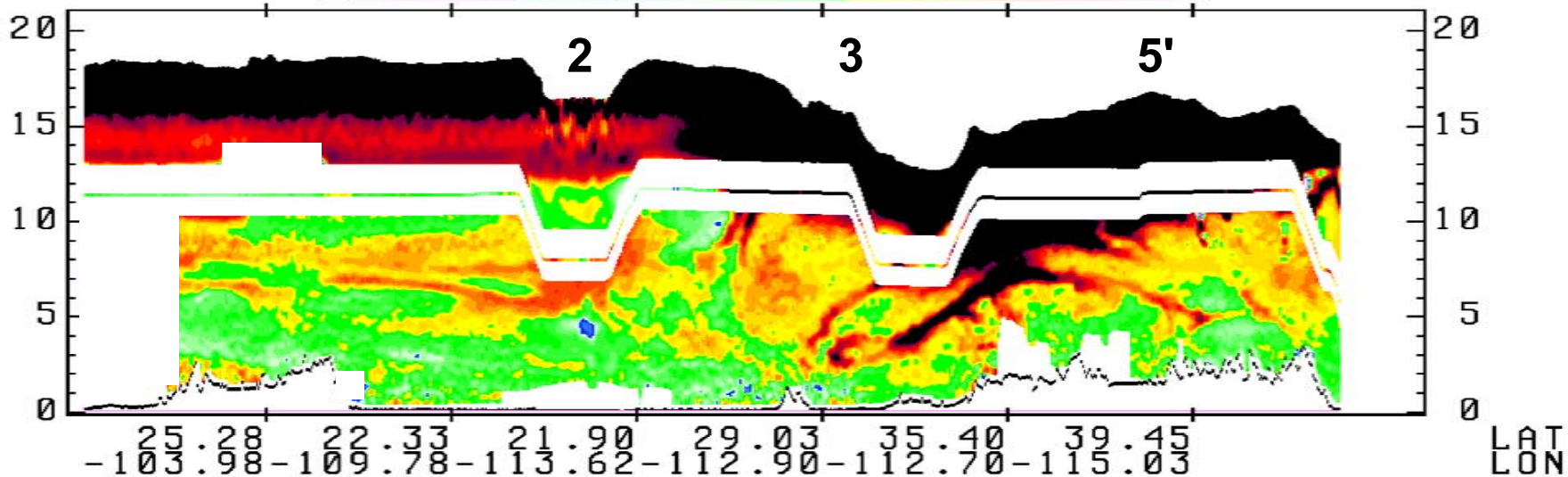
0 20 40 60 80 100



2

3

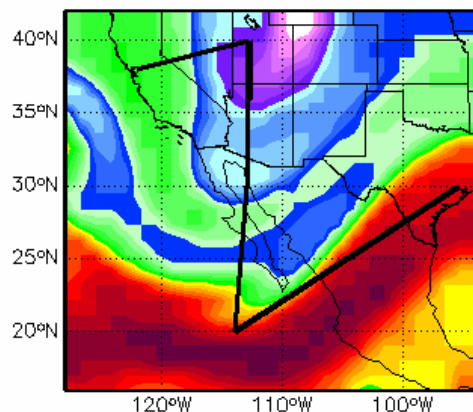
5'



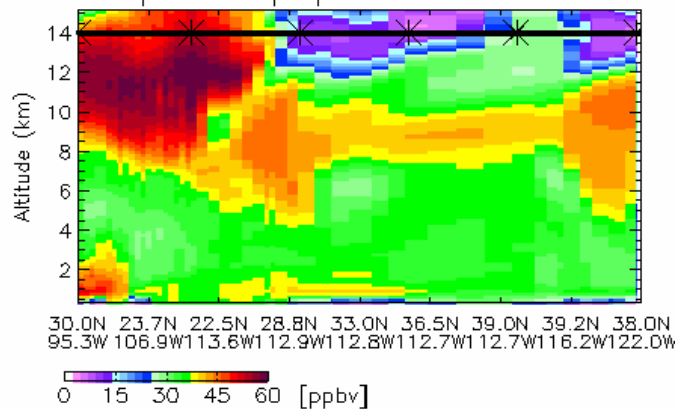
GMAO O₃ and CO forecast for 3/22 6Z Initialized 3/21 0Z

O_x at 220 hPa

Tropospheric O_x 20060322 06 GMT at 220 hPa (11 km)



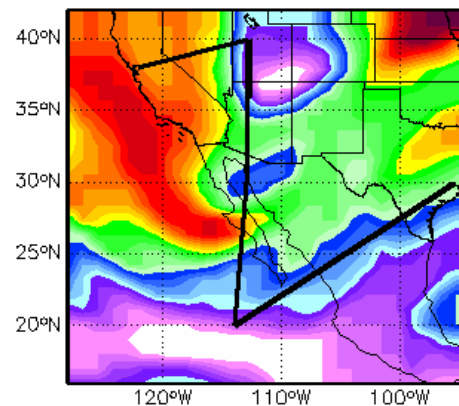
Curtain plot – Tropospheric O₃ 20060322 06 GMT



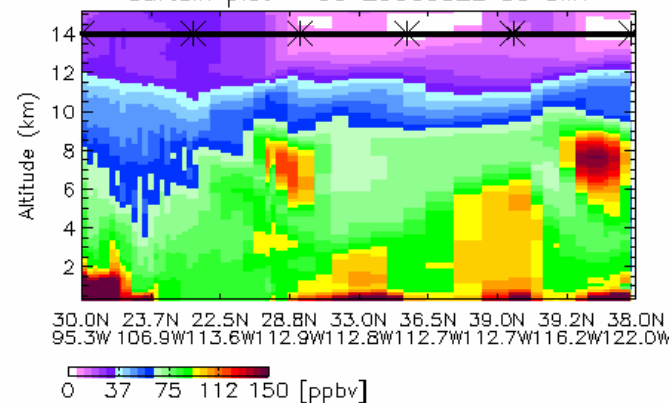
Trop O₃ curtain along flight track

CO at 220 hPa

CO 20060322 06 GMT at 220 hPa (11 km)



Curtain plot – CO 20060322 06 GMT



Trop CO curtain along flight track